established at South Kensington, and this continues its good work as part of the Royal Naval College.

This institution had the great advantage that the Admiralty students from the dockyard schools were well prepared for advanced instruction. It has, through the distinguished careers of many of its students, exercised an important influence on the shipbuilding industry in this country, and on the development of the great Navy which commanded the seas in the late war. The organisation of the theoretical part of the instruction was mainly due to the ability, industry, and originality of Prof. Cotterill. An account of the courses of study is given in the later editions of his "Applied Mechanics." The school was open to private students, and some of these obtained important positions in private shipyards and in the constructive departments of foreign navies.

Prof. Cotterill's earliest papers were on least action, on the theory of propellers, and on the reaction of an elastic fluid escaping from an orifice. In 1878 he published a treatise on "The Steam Engine considered as a Thermodynamic Machine"; and in 1884, a treatise on "Applied Mechanics." Both these have passed through several editions, are still in use, and have much influenced the teaching of the subjects in engineering schools in this country and in America.

WE record with much regret the death on January 22, at seventy-six years of age, of Sir William Christie, K.C.B., F.R.S., Astronomer-Royal from 1881 to 1910.

Notes.

IN a letter to the *Times* of January 23 Mr. F. P. Mennell recalls his description of the bone-cave at Broken Hill, Rhodesia, published in the *Geological Magazine* in 1907, and adds some further details in reference to the recent discovery of *Homo rhodesiensis* in a deeper extension of the cave. He emphasises the fact that all the stone and bone implements found with this extinct cave man are such as are used to-day by the Bushmen and Hottentots in outlying places, while all the mammalian bones, evidently broken for food, belong either to living species or to species closely allied to those still existing in the neighbourhood. The Rhodesian man is therefore probably not so old as the primitive types of man who wielded the Palæolithic implement in western Europe. We may add that Mr. Mennell's original paper was referred to in NATURE of November 17 last by Dr. Smith Woodward, who also expressed the opinion that Rhodesian man would prove to be of comparatively recent date.

IT was resolved by the General Committee of Subscribers to the Rayleigh Memorial, after arranging for the erection of the tablet in Westminster Abbey, which was unveiled recently, "that the executive committee be empowered to use the balance for the establishment of a library fund at the Cavendish Laboratory." The amount subscribed to the memorial fund was 1575*l.*, and after defraying all expenses connected with the tablet the balance was 687*l.* 15*s.* 8*d.* In accordance with the resolution of the general committee, Sir Richard Glazebrook and Sir Arthur Schuster, secretaries of the fund, have now sent a cheque for this amount to the Vice-Chancellor of the University of Cambridge. The committee desires that of this sum 600*l.* should be treated as capital, the interest upon which is to be at the disposal of the Cavendish professor annually for the purposes of the library; the balance of the capital, namely, 87*l.* 15*s.* 8*d.*, may be drawn upon at once in order to bring the library up to date. It is suggested that a book-plate should be prepared connecting the books purchased out of the fund with Lord Rayleigh.

THE Père Lachaise cemetery in Paris, which has during the last few days witnessed several acts of homage to the memory of the great dramatist Molière, contains a large number of tombs and monuments of remarkable interest. Among these are many to the men of science of last century. The cemetery was laid out in 1804, and the monument to Molière was one of the first erected in it. Walking round the paths familiar names of statesmen, poets, musicians, writers, soldiers, and painters catch the eye at every turn. Science is represented by the mathematicians Poinsot, Monge, Hachette, and Charles; the astronomers Arago and Delambre; and the chemists Dulong, Gay Lussac, Chaptal, Boussingault, and Raspail. Comte, Cuvier, Bichat, Claude Bernard, and Geoffrey St. Hilaire are also commemorated. Quite close together will be found the tombs of Madame Lavoisier who made such an unhappy alliance with Rumford, and Madame Blanchard, the intrepid aeronaut who perished in 1819. Other pioneers in the conquest of the air whose names are perpetuated in the cemetery are Robertson, Charles, Croce-Spinelli, Gaston, and Tissandier.

FROM the *Daily Telegraph* we learn that the Paris Academy of Sciences has received an invitation, through Prof. Kriloff, a specialist in naval construction, to send representatives to Moscow to the celebration of the bicentenary of the Russian Academy of Sciences, to be held in 1925. Prof. Kriloff, in his speech, expressed the hope that science would throw solid bridges over the chasms made by war, and that the relations of all the peoples would be re-established with the same cordiality as before. The initiation of the Russian Imperial Academy of Sciences was due to Peter the Great, though its actual inauguration was carried out by his widow, Catherine I. It was she who invited the great mathematician, Leonhard Euler, to her capital, but her death occurred on the day Euler set foot on Russian soil. Joined by Daniel Bernoulli and the astronomer Delisle, Euler continued to work at Petrograd until 1741. His surroundings, however, were not always congenial, and afterwards when a princess at the Court in Berlin asked him why he spoke so little, he replied: "Madame, parce que je viens d'un pays où quand on parle on est perdu." Euler continued to send memoirs to the Academy, and in 1766 he accepted the invitation of Catherine II. to return to Petrograd, and he died there in September, 1783. Some of his sons entered the Russian service, while his son-in-law, Nicolas von Fuss, became permanent secretary to the Academy.

ONE of the largest telescopes in the world, hitherto unused, is likely to be brought into service shortly, according to an announcement made at a recent meeting of the American Astronomical Society. It is a 60-in. reflector constructed by the late Dr. A. A. Common about thirty years ago and bought by the Harvard Observatory in 1902. It is exceeded in size by two telescopes only, both of them on the Pacific coast—the 100-in. reflector at Mount Wilson, in California, and the 72-in. reflector, the property of the Dominion Government, at Victoria, in British Columbia. A second reflector at Mount Wilson is of the same size as that at Harvard. The Harvard instrument was purchased for visual and photographic star measurements, but when set up and tested was found unsatisfactory for that purpose. It was therefore abandoned, and has ever since been stored away in the observatory grounds. Meanwhile, the science of astrophysics has provided an increasingly large number of problems, in which the light and heat from a star, rather than the size of a photographic image, are the things measured. It is for such problems as these that the Harvard telescope, with its 5-ft. mirror—once considered useless because it would not produce perfect images—is now to be employed.

AT the annual general meeting of the Royal Society of Arts, on June 30, 1920, it was announced that unless the society succeeded in purchasing the freehold of its house in John Street, Adelphi, it would be obliged to find new quarters after March, 1922. The matter was referred to again in the annual meeting on June 29 last, and the sum of 50,000*l.* was mentioned as the cost of buying and renovating the property. An appeal for subscriptions was therefore made in order to obtain funds to secure permanent possession of the historic house built for the society by the brothers Adam about 1775. So far, two lists of subscribers have been issued in the society's journal, from which it appears that the sum of 40,678*l.* has already been raised. Of this total no less than 30,000*l.* is due to the generosity of one anonymous benefactor. Other noteworthy subscriptions are 2,500*l.* from Sir Charles A. Parsons, and 1000*l.* each from Lord Bearsted, Sir Dugald Clerk, the Earl of Iveagh, Lord Leverhulme, and Mr. A. A. Campbell Swinton. The sum already subscribed should be sufficient to secure the continuity of tenure of the John Street house, which has been the scene of the society's labours for the past 147 years, but it is to be hoped that further contributions will be forthcoming, so that the whole of the purchase-money may be available, and also means for making desirable alterations in the meeting-room and other parts of the building.

AT the annual general meeting of the Royal Meteorological Society on January 18 the Symons gold medal, which is awarded biennially for distinguished work in connection with meteorological science, was presented to Col. H. G. Lyons. Dr. Charles Chree was elected president of the society for the year 1922.

DR. G. CLARIDGE DRUCE has recently been elected a corresponding member of the Botanical Society of Czecho-Slovakia "for his inestimable services to botanical science." The diploma is signed by the president of the society, Prof. Karel Domin, professor of systematic botany in the University of Prague.

ON Tuesday next, January 31, Prof. H. H. Turner begins a course of three lectures at the Royal Institution on "Variable Stars," and on Thursday, February 2, Sir Napier Shaw delivers the first of two lectures on "Droughts and Floods." The Friday evening discourse on February 3 will be delivered by Sir Francis Younghusband on "The Mount Everest Expedition," and on February 10 by Dr. Halliburton on "The Teeth of the Nation."

THE Civil Service Commissioners announce that an open competitive examination for not fewer than fifteen situations as assistant engineer in the Engineer-in-Chief's Department of the General Post Office will be held in London, Edinburgh, and Manchester in April next, commencing on April 20. The limits of age are twenty and twenty-five, with certain extensions. Regulations and forms of application will be sent in response to requests by letter addressed to the Secretary, Civil Service Commission, Burlington Gardens, London, W.1.

HAVING regard to the confusion which now exists, especially in overseas trade, due to the difference between the American gallon and the Imperial gallon, the Decimal Association urges that it is desirable for an agreement to be reached between the Governments of Great Britain and the United States to the effect that as an alternative to either of the above gallons being adopted by both countries as a common standard, each of them should forthwith adopt the litre, which could be described as the "metric gallon." It is obvious that uniformity of practice in a matter of this kind is most desirable, and the adoption of the metric gallon would not only standardise practice between Great Britain and America, but also with practically all other countries engaged in international trade.

A PORTRAIT of Sir Patrick Manson was unveiled by Sir James Michelli at the London School of Tropical Medicine on January 20. The portrait was subscribed for by a large number of past and present students and other friends at home and abroad. The painting was entrusted to Mr. E. Webster, and is a most pleasing likeness. It hangs in the vestibule of the school, where it will be seen by the large number of students attending the classes. Reproductions of the portrait will be made by Mr. Malcolm Osborne, and will soon be ready for distribution. In recognition of Sir Patrick Manson's services as a clinician, money has also been subscribed for a medal, which will be awarded annually to those who distinguish themselves in clinical work. The medal will bear a portrait of Sir Patrick Manson by Mr. John Pinches.

THE programme for the Air Conference to be held at the Guildhall on February 7–8 has now been issued. During the morning of the first day of the meeting papers will be read by Lord Gorell on civil aviation, and Lt.-Col. W. A. Bristow on aerial transport of to-day and to-morrow. Papers on research work from the points of view of designers, constructors, and users by Major F. M. Green, on the progress of research by Brig.-Gen. R. K. Bagnall-Wild, and on airships by Major G. H. Scott will occupy the afternoon session. The whole of the second day of the meeting will be devoted to general discussions. In the morning Capt. F. E. Guest will preside, and civil aviation papers read during the previous morning will be dealt with; in the afternoon the chair will be taken by Lord Weir of Eastwood, and the technical papers of the previous afternoon will be discussed.

INFLUENZA had materially increased in severity, according to the Registrar-General's return for the week ending January 14. Deaths due to the epidemic numbered 1240 for the ninety-six great towns of England and Wales, an increase of 433 on the preceding week. In London the deaths were 551 for the week, an increase of 197 on the preceding week. During the great epidemic of 1918–19 the deaths from influenza in London amounted to 2458 in the week ending November 2 and to 2433 in the week ending November 9, but with the exception of the 1918–19 epidemic the death-rate is now higher than in any other epidemic of influenza since 1890, the nearest approach occurring in the epidemic of 1892, when for the week ending January 23 the deaths in London numbered 506. During the week ending January 14 the deaths between the ages of sixty-five and seventy-five were 21 per cent. of the total. Deaths from pneumonia and bronchitis have also considerably increased.

A SUMMARY of weather results for 1921 is given in the *Weekly Weather Report* of the Meteorological Office for the closing week of December, showing the mean and aggregate values for the several districts of the British Isles. There was a general deficiency of rain, the only districts with an excess being the north and west of Scotland, these districts having respectively 106 and 104 per cent. of the average fall. In the east of Scotland the rainfall for the year was 87 per cent. of the average, and in the north of Ireland 89 per cent., whilst in the north-west of England it was 86 per cent. In the north-east of England the rainfall was 73 per cent. of the average, and in the Midland Counties 69 per cent. The rainfall was only 48 per cent. of the average in the east of England, followed by 50 per cent. in the south-east of England, 54 per cent. in the English Channel district, and 60 per cent. in the south-west of England. The district having the largest amount of rain during the year was the north of Scotland with 54·34 in., while in the east of England the total measurement was 13·45 in., and in the south-east of England 13·84 in. The mean temperature for the year was above the normal in all districts; the greatest excess was 2·7° F. in the English Channel district and 2·5° F. in the north-east and east of England and the Midland Counties. The duration of bright sunshine was in excess of the average in all districts over Great Britain; the greatest excess was 0·7 hour per day, amounting to 250 hours for the year in the east of England and 0·6 hour per day in the Midland Counties and the south-east of England.

THE problem of the conservation of the coal resources of Great Britain involves the study and classification of the coal seams which are at present being worked or developed, and also of seams above or below ground which are being left unworked or are thrown aside. On its directly practical side this work must deal primarily with the suitability of each particular coal for those purposes for which its individual qualities render it most appropriate, and the Fuel Research Board believes that the most effective way of achieving this end is by the co-operation in local committees of colliery owners, managers, and consumers with the representatives of the Fuel Research Board and the Geological Survey. By this combination local knowledge and experience, as well as the initiative of those most deeply interested in the practical aspects of the survey, will be secured. Thus from the outset the survey will assume a practical character. The selected seams will be submitted to physical and chemical examination by the local experts, and as a result of this examination a further selection will be made of those which appear to justify experiments on a practical scale to test their suitability for particular uses or methods of treatment. This experimental work will be carried out either at H.M. Fuel Research Station or at other works, as may be found most convenient. A start has already been made in the Lancashire and Cheshire district, where the local research association has been recognised by the Fuel Research Board as its representative body for the purpose of dealing with the physical and chemical survey of the coal seams in this area. The chairman of the new committee is Mr. R. Burrows, and the director of research Mr. F. S. Sinnatt.

A LEADING article in the *Museums Journal* for December suggests as a remedy for the alleged overcrowding of the national museums that their redundant specimens should be transferred to the provincial museums, and asks for a Commission to consider the limits of our national museums and how far it is possible for them to assist the provincial and "Colonial" museums. In the January issue Mr. Williamson, of the Derby Museum, while admitting past help, would welcome gifts or long loans on a more systematic plan and with more reference to local needs. Dr. F. A. Bather, while in agreement with the proposal, maintains that such transference is the policy of the British Museum, which is only prevented from carrying it out fully by inadequacy of staff. He also points out that the interests of scientific students demand the accumulation of large collections in as few centres as possible, and that the bulk of such material is not really redundant. Sir Frederick Kenyon in his presidential address to the Museums Association in July last expressed a wish to meet the needs of provincial museums if they would make them known.

DR. RAPHAEL KARSTEN, lecturer in the University of Helsingfors, Finland, has made an important contribution to anthropology in the first part of his "Studies in South American Anthropology." He deals more particularly with personal ornamentation, ceremonial mutilation, and kindred customs. The savage man's love for self-decoration has been discussed by many anthropologists. Darwin believed that the object of these decorations was to make man beautiful, and especially attractive to the other sex; W. Joest, while admitting that body-painting has a practical value in protecting the body from insects, heat, or cold, admits that the principal motive, besides inspiring enemies with fear in battle, is sexual desire, a view generally accepted by Westermarck in his "History of Human Marriage." Dr. Karsten believes that the part which magic has played in originating primitive customs has, up to recent times, been much underrated, owing to our defective knowledge of the psychology of savage man. This side of the subject is pursued in this monograph, which, though principally devoted to South America, discusses the question from other points of view, and, with its careful citation of authorities, deserves the attention of anthropologists.

NATIONAL laboratories for the cleaning, restoration, and preservation of antiquities have for some years existed at Berlin, Copenhagen, and Stockholm. Well-known books on the subject have been published by Dr. Rathgen (ed. 2, 1914) and Dr. Rosenberg (1917), the latter dealing with iron and bronze objects only. In our own country there was no laboratory for the purpose until 1920, when Dr. Alexander Scott was induced by the Department of Scientific and Industrial Research to direct the work of a small laboratory temporarily equipped at the British Museum (Bloomsbury). So far as the English language was concerned, G. A. and H. A. Auden's translation of Rathgen's first edition (1905), a chapter in Prof. Flinders Petrie's "Methods and Aims in Archæology" (1904), and a few articles in the *Museums Journal*, notably a well-illustrated one by Dr. Rathgen (1913), were about all the museum curator had to guide him. Now the Department just mentioned has issued a first report by Dr. Scott (Bulletin No. 5, 1921, 2*s*.). It deals with prints, enamels, silver, lead, iron, copper and copper alloys, and rock-paintings. Dr. Scott has attacked the problems *de novo*, and has evolved some new and ingenious methods. Their success is illustrated by some photographs "before" and "after."

A VERY complete summary on the subject of anthrax infection in man appears in the Bulletin Mensuel for November last of the Office International d'Hygiène Publique, Paris (t. 13, No. 11, 1921, pp. 1135-1239). Anthrax infection in man is most commonly seen as a cutaneous manifestion, the characteristic malignant pustule, which is caused by local inoculation. Internal anthrax also occurs in the lungs, intestine, and brain, and is caused by inhaling or swallowing the spores of the anthrax bacillus. Internal anthrax is always fatal, but the malignant pustule is fairly amenable to treatment, if taken in time, by anthrax serum or by excision. The disease is always transmitted from an affected animal, living or dead, or from the commercial products derived from an affected animal, such as skins and hides, goat, camel, or horse hair, and wool. Between 1915 and 1920 a number of cases of human anthrax due to shaving-brushes has been reported in England (49), United States (40), Holland, Italy, and Egypt, the brushes having been made with infected hair. In Holland few cases of human anthrax occur, less than a dozen per annum. The same is the case in Norway, in spite of the frequent occurrence of the disease in domestic animals, though among these the frequency of the disease is diminishing, from 686 animals affected in 1906 to 33 in 1920.

THE last report of the Grain Pests (War) Committee established by the Royal Society has now made its appearance. It required the conflagration of a European war and the threat of starvation to Britain to stir us to investigate some of the problems connected with the destruction of grain by insects. Though the committee set up by the Royal Society was purely a war one, it seems a pity that it should cease to act just when the fringe of the subject has been touched. Could the Royal Society not be induced to continue the investigations? The present report (No. 9) contains a short note by Prof. Goodrich on the parasitisation of certain grain beetles by Hymenoptera. It is shown that these parasites are not likely to prove of value as a means of controlling the beetles, as the chalcids are themselves kept in check by carnivorous acarids. The second part is by Dr. J. Waterston, who deals with the systematics of the parasitic Hymenoptera. These parasites are, like their hosts, cosmopolitan, and many of the species previously described were certain to fall as synonyms. This comprehensive and beautifully illustrated paper should prove the basis of future work. The last report is that by Mr. J. H. Durrant on the species of insects found in grain; hundreds of samples of grain were examined from different parts of the world. These are all tabulated, showing the species found in each. We note that several species of beetles are new to our lists of grain pests. Altogether, much useful information is contained in the report.

IN the November issue of the Journal of the Franklin Institute Dr. Carl Hering brings together some of the phenomena produced by the flow of heavy currents in conductors which have been observed in recent times, and points out that in many cases they violate some of the laws of electromagnetism as stated in current text-books. He therefore pleads for a restatement of these laws in such form that there shall be no apparent exceptions to them. In the first instance, he points out that it is not sufficient for the production of electromotive force by magnetic induction that lines of magnetic force shall cut through a *circuit*, but that the lines must cut through a *conductor*. Further, he contends that the existence of the "pinch" effect, contracting the section of a conductor carrying current, of the "stretch" effect, lengthening the conductor, and of what he has named the "corner" effect, when a conductor changes its direction, render it advisable to modify the dictum that the forces on a conductor "can never have a resultant in the direction of the axis."

THE firm of Messrs. Barr and Stroud, which grew out of the remarkable inventive work of the partners, was from 1888 until 1918 mainly occupied with the manufacture of range-finders and other instruments relating to the gunnery requirements of many different countries. They have since turned their attention also to the small type of internal-combustion engine used on motor-cycles, and, as a consequence, have now put on the market an engine of 349 c.c. capacity working on the four-stroke cycle and having a sleeve-valve and air-cooling. The engine is made under the well-known Burt and McCollum patents and has several attractive features. The absence of all external valve mechanism makes for cleanliness and greatly lessens engine noise. It is a light engine, since its weight to horse-power ratio is, it appears, but 7 lb. per h.p. when giving the maximum power of 7 h.p. The sleeve has a double motion, both horizontal and vertical, so combined that any point in it moves in an elliptical orbit. It has five curiously shaped ports, two for inlet, two for exhaust, and one for the double purpose, serving each in turn. The general design is very attractive, and the claim for a special degree of ease in dismantling and adjusting appears to be substantiated by an examination of the details of the design. Tests on the road have shown a satisfactory degree of fuel economy.

DURING the past forty years many proposals have been considered by the authorities in New South Wales for providing suitable means of communication across Sydney Harbour to accommodate the growth and development of Sydney. Tenders and designs have now been invited for the construction and erection of a cantilever bridge. Some particulars of this project are given in an illustrated article in *Engineering* for December 30 last. The bridge will carry four lines of railway, a main roadway 35 ft. wide, a motor roadway 18 ft. wide, and a footway 15 ft. wide. The total length, including the approach spans, will be 3816 ft.; the headway required for shipping will be 170 ft. at high water for the central 600 ft. of the bridge. The bridge is to consist of steel cantilevers with shore and harbour arms each 500 ft. long and a central suspended span of 600 ft. The clear span from centre to centre of the main piers will be 1600 ft. For the information of tenderers a number of interesting tables is given, showing the range of temperatures and intensities of prevailing winds and the extreme velocities and pressures recorded during the severest storms in Sydney. Full particulars are also given regarding the loads to be employed in estimating and the stresses to be used. The specification has been prepared by the chief engineer, Mr. J. J. C. Bradfield.

THE council of the Chemical Society has issued a pamphlet of eleven pages dealing with the furnishing and equipment (so far as fixed fittings are concerned) of chemical laboratories as the result of a conference of various bodies interested called by the society eighteen months ago at, we believe, the suggestion of the Royal Institute of British Architects, though this is not mentioned. The object in view was to ascertain whether, in view of the high prices of labour and materials, economies could be effected in laboratory fittings. A small committee of the society was appointed and decided to investigate present practice, and the report gives information collected from various institutions. Though necessarily but a slight contribution to a very large subject, the report contains a useful epitome of the methods in use for forming and treating bench-tops, reagent shelves, fume cupboards, sinks, and waste channels, while notes on ventilation, supply services and floor and wall surfaces are added. Finally, a short bibliography is given on the subject of laboratories, upon which, however, there is very little literature. Laboratory fittings are always costly, and at the present time, when so much educational work is held up owing to lack of funds for its material development, any information which will enable those responsible for designing laboratory fittings to cheapen and simplify requirements is bound to be of service. As regards the use of wood particularly, it seems much to be desired that experiments be undertaken in order to ascertain whether many of the cheaper soft woods cannot, by impregnation or other suitable treatment, be made to serve in place of imported hard woods.

THE August issue of the Journal of the American Chemical Society contains an account of the separation of the isotopes of chlorine by diffusion, contributed by W. D. Harkins and A. Hayes. The work was begun in 1915, and has been carried out in the chemical laboratories of the University of Chicago. A preliminary account of the separation of a heavier fraction from hydrogen chloride by diffusion through the stems of tobacco-pipes was given in NATURE of April 22, 1920, p. 230. Calculations by Rayleigh's formula show that to produce an increase of 0·2 in the atomic weight would require the diffusion of 130 tons of hydrogen chloride gas. The relative amounts of the different isotopes are as important as the atomic weight differences, and it is shown that, contrary to what has been supposed, it is easier to produce a small increase in the atomic weight of chlorine than to produce the same increase in the atomic weight of neon. The diffusion was carried out through clay pipe-stems or tubes at atmospheric pressure. Low pressures would be more advantageous. The increase in atomic weight amounted in different experiments to from slightly less than to considerably more than one part in a thousand. A considerable amount of the isotopic acid has been produced. These experiments seem to confirm beyond doubt the existence of the isotopes of chlorine first announced by Dr. Aston on the basis of positive-ray analysis. The latter method gives, in addition, the atomic weights of the two isotopes.

MESSRS. BENN BROS., LTD., announce for publication in March a work which should be of interest and value to many readers, viz. "The Early Ceramic Wares of China," by A. L. Hetherington, in which will be described the main characteristics of the products of the Chinese factories before 1368. The same publishers also promise a new series entitled "The Chemical Engineering Library," the first nine volumes of which will be The General Principles of Chemical Engineering Design; The Layout of Chemical Works, H. Griffiths; Materials of Construction: I., Non-Metals, H. Griffiths; Materials of Construction: II., Metals, H. Griffiths; Mechanical Handling, A. Reid; Weighing and Measuring Chemical Products, Malan and Robinson; Flow of Liquid Chemicals in Pipes, N. Swindin; Chemical Works Pumping, N. Swindin; and Factory Wastes as Fuels, A. Reid.

MESSRS. H. K. LEWIS AND CO., LTD., 136 Gower Street, London, have just issued an up-to-date list of "College Text-books and Works of Reference in Science and Technology." The titles are arranged under authors' names, and are classified under eighteen subjects, some of which, such as chemistry, engineering, etc., are again divided. The subjects are arranged alphabetically, whilst a contents-list on the first pages makes reference to any subject quick and easy. The list will be sent post free to any address on application.

Our Astronomical Column.

DEDUCTION OF STAR-DISTANCES FROM PROPER MOTIONS.—The proper motions are almost our sole guides in estimating the distances of the more remote stars. Hence any method that affords a check on the results is of value. Prof. H. N. Russell points out in the *Astrophysical Journal* for September last that we can estimate the distance either (1) by correlating the motion away from the solar apex with the sun's velocity, or (2) by correlating the cross-motion with the line-of-sight velocity. As a test he has divided the 180 stars of type B_0 to B_5, the radial velocities of which were found by Campbell, into eighteen groups, the mean position of each group being nearly the same. He finds for the general mean parallax 0·0083″ from (1) and 0·0058″ from (2). One reason given for the smaller value from method (2) is that some of the stars may be undetected spectroscopic binaries, in which case the adopted line-of-sight velocity is presumably too great. The probable error of result (1) is 0·0010″, of (2) 0·0014″. In general, method (1) gives the best results for objects of small average velocity like the B stars, while (2) is better for quick movers like the planetary nebulæ. The apparent close connection between period and absolute magnitude in the Cepheid variables was originally deduced from results obtained by method (1), and later obtained considerable confirmation from a study of the variables in the globular clusters, which appear to be mainly Cepheids.

METEORIC SHOWER OF DECEMBER 4–5, 1921.—Mr. W. F. Denning writes that he has received a communication from the Tokyo Astronomical Observatory, Japan, stating that an abundant display of meteors was observed there on the morning of December 5. Watching 55 minutes between 4.15 and 5.10 G.S.T. of Japan (December 4 between 7.15 and 8.10 G.M.T.), Mr. S. Inouye saw fifty or sixty meteors, and recorded the paths of forty-six meteors, among which forty-four radiated from about 156°+37° near β Leonis Minoris. The meteors were rather rapid, and the magnitudes ranged nearly from 2·0 to 4·5.

On the next morning Mr. Inouye watched 15 minutes, but no meteors belonging to the same radiant were observed.

Mr. S. Kanda calculated the following elements from the above radiant point, assuming the orbit to be parabolic:

$$\Omega=252{\cdot}1^\circ,\ w=232{\cdot}6^\circ,\ i=133{\cdot}3^\circ,\ q=0{\cdot}791.$$

No comet is identified with these elements.

Mr. Denning adds that this shower in Leo Minor was well observed at Bristol on November 25–28, 1876, when he observed 26 meteors from the point 155°+36°. The observation was reported in NATURE of December 21, 1876, p. 158. The shower was also seen by him on December 2, 5, 7, and 10, 1885, when the radiant point was redetermined at 152°+40°

The display witnessed at Tokyo on the night following December 4 last could scarcely have been well observed in England, for when the maximum occurred at 7.35 p.m. G.M.T. the radiant point was close to the north-north-east horizon, whereas at Tokyo it was situated only a few degrees east of the zenith, and splendidly placed for the abundant distribution of its meteors.

POPULAR ASTRONOMY IN SWEDEN.—The Stockholm periodical *Populär Astronomisk Tidskrift* continues to produce articles of much interest and practical value. Häfte 3 and 4, 1921, contain a useful illustrated article by Edv. Jäderin on the graphical prediction of eclipses and occultations. The methods are easy to follow and capable of an accuracy that is amply sufficient.

O. A. Åkesson discusses the periodicity and motion of sun-spots. The daily amounts of rotation for different latitudes are plotted for the two periods 1886–97 and 1898–1909. The values for the second period show a diminution of nearly 1 per cent. compared with the former. H. v. Zeipel contributes a study of the cluster M 37, near θ Aurigæ. He finds the colour-indices by comparison of photographic with photo-visual magnitudes, and deduces a distance of 1500 parsecs. There is also an illustrated article on the Babelsberg Observatory and its new refractor (aperture 65 cm.) and reflector (aperture 120 cm.), both made by Zeiss.

The approaching series of occultations of Aldebaran are the subject of a useful note. Accurate observations of the bright-limb phases of these phenomena will serve to test the conjecture that there may be a sensible atmosphere on the moon's sunlit face.